

Name: _____

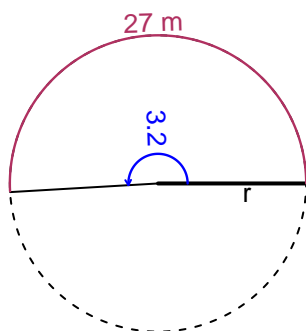
Date: _____

Trig Final (SLTN v625)

- You should have a calculator (like [Desmos](#)) and a [unit-circle](#) reference sheet.

Question 1

In the figure below, we see a circle and a central angle that subtends an arc. The angle measure is 3.2 radians. The arc length is 27 meters. How long is the radius in meters?

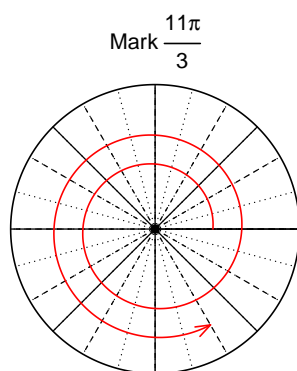


$$\theta = \frac{L}{r} \quad r = \frac{L}{\theta} \quad L = r\theta$$

$r = 8.438$ meters.

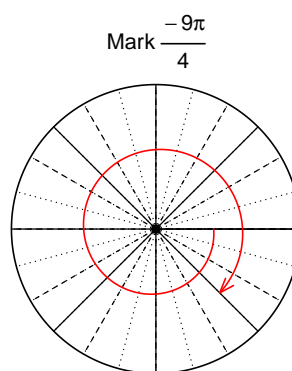
Question 2

Consider angles $\frac{11\pi}{3}$ and $-\frac{9\pi}{4}$. For each angle, use a spiral with an arrow head to **mark** the angle on a circle below in standard position. Then, find **exact** expressions for $\sin\left(\frac{11\pi}{3}\right)$ and $\cos\left(-\frac{9\pi}{4}\right)$ by using a unit circle (provided separately).



Find $\sin(11\pi/3)$

$$\sin(11\pi/3) = -\frac{\sqrt{3}}{2}$$



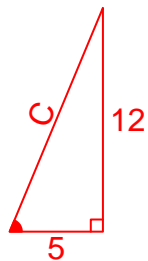
Find $\cos(-9\pi/4)$

$$\cos(-9\pi/4) = \frac{\sqrt{2}}{2}$$

Question 3

If $\tan(\theta) = \frac{12}{5}$, and θ is in quadrant III, determine an exact value for $\cos(\theta)$.

Ignore any negatives and the quadrant, and draw a right triangle (based on SOHCAHTOA) in standard (quadrant I) orientation.



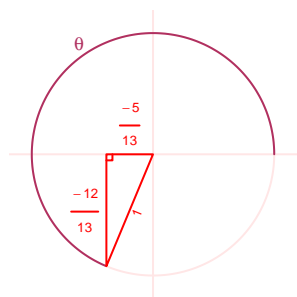
Solve the Pythagorean Equation

$$5^2 + 12^2 = C^2$$

$$C = \sqrt{5^2 + 12^2}$$

$$C = 13$$

Rescale the triangle so the hypotenuse is 1. Reflect the triangle into Quadrant III in a unit circle.



$$\cos(\theta) = \frac{-5}{13}$$

Question 4

A mass-spring system oscillates vertically with a midline at $y = -4.35$ meters, a frequency of 8.38 Hz, and an amplitude of 3.27 meters. At $t = 0$, the mass is at the midline and moving up. Write an equation to model the height (y in meters) as a function of time (t in seconds).

Any of these equations would get full credit.

$$y = 3.27 \sin(2\pi 8.38t) - 4.35$$

or

$$y = 3.27 \sin(16.76\pi t) - 4.35$$

or

$$y = 3.27 \sin(52.65t) - 4.35$$